

WHAT IS CLAIMED IS:

1. A function generator comprising a cascade connection of two or more current exchanger circuits,

wherein when n is 1 or a larger integer, each of the two or more current exchanger
5 circuits has the function of receiving a current in proportion to the n th power of a difference between an ambient temperature and a reference temperature and outputting a current in proportion to the $n+1$ th or $2n$ th power of the difference between the ambient temperature and the reference temperature.

10 2. The function generator of claim 1,

wherein at least one of the two or more current exchanger circuits includes

a first circuit including a series connection of two PN junctions into which a current in proportion to the difference between the ambient temperature and the reference temperature flows,

15 a second circuit including a PN junction into which a constant current flows regardless of the ambient temperature, and

an output transistor for receiving between the base and emitter of the output transistor a difference between a voltage generated in the first circuit and a voltage generated in the second circuit, and

20 generates a current in proportion to the square of the difference between the ambient temperature and the reference temperature at the collector of the output transistor.

3. The function generator of claim 1,

wherein at least one of the two or more current exchanger circuits includes

25 a first circuit including a series connection of two PN junctions into which a

current in proportion to the square of the difference between the ambient temperature and the reference temperature flows,

a second circuit including a PN junction into which a constant current flows regardless of the ambient temperature, and

5 an output transistor for receiving between the base and emitter of the output transistor a difference between a voltage generated in the first circuit and a voltage generated in the second circuit, and

generates a current in proportion to the fourth power of the difference between the ambient temperature and the reference temperature at the collector of the output transistor.

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4. The function generator of claim 1,

wherein at least one of the two or more current exchanger circuits applies a voltage generated by giving an input current to a resistor having a first temperature coefficient to a resistor having a second temperature coefficient and outputs a current corresponding to a
15 current flowing into the resistor having the second temperature coefficient.

5. The function generator of claim 4, wherein the first temperature coefficient is a linear function of the difference between the ambient temperature and the reference temperature, and

20 wherein the second temperature coefficient is constant regardless of the ambient temperature.

6. A temperature compensated crystal oscillator comprising:

a crystal oscillator using a crystal resonator;

25 control means for controlling the oscillation frequency of the crystal oscillating

circuit in accordance with a compensation voltage corresponding to the ambient temperature; and

a function generator for generating the compensation voltage,

wherein the function generator includes a cascade connection of two or more
5 current exchanger circuits, and

wherein when n is 1 or a larger integer, each of the two or more current exchanger circuits has the function of receiving a current in proportion to the n th power of a difference between the ambient temperature and a reference temperature and outputting a current in proportion to the $n+1$ th or $2n$ th power of the difference between the ambient
10 temperature and the reference temperature.